

RECOMMENDED PRACTICE FOR ROAD DELINEATORS

(First Revision)



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RECOMMENDED PRACTICE FOR ROAD DELINEATORS

1. INTRODUCTION

1.1 The role of delineators is to provide visual assistance to drivers about alignment of the road ahead, especially at night. Delineators are particularly effective in the case of complex locations involving changes in horizontal/vertical geometry, and during severe weather conditions such as heavy rain, fog or snow. Normally, reflectors are used on the delineators for better night time visibility.

1.2 In a broad sense, “delineation” stands for any device or treatment whose aim is to outline the roadway or a portion thereof. This could include painted lines, raised pavement markers, posts, post-mounted reflectors or contrast treatments of the pavement. Delineation by pavement markings is covered by IRC:35, “Code of Practice for Road Markings”. This code deals only with post type retro reflective delineators or embedded on any concrete structures/trees.

1.3 The code was first published by IRC in 1981. A need was felt to update the document keeping in view of the new and improved materials which are now available. A Sub-group consisting of Shri Pawan Kumar Singh (as Convener of the Sub-group) along with Dr. S. Velmurugan, Shri S.K. Popli, Dr. P.K. Agarwal and Shri Parampreet Singh as members was constituted to prepare the draft revision document. The draft prepared by the Sub-group was considered by the H-7 committee (personnel given below) at its meeting held on 10th October 2018. The Convener was authorized to forward the same to IRC after modifying further in the light of the deliberations for placing before the Highways Specifications and Standards (HSS) Committee. Subsequently, HSS Committee considered and approved the draft in its meeting held on 23rd October, 2018. The revised draft incorporating the comments of HSS was approved by the 216th Council in its meeting held on 22nd November, 2018 at Nagpur (Maharashtra) for printing.

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2. SCOPE

2.1 Delineators are classified under three types:

- (i) Roadway Indicators
- (ii) Median Markers
- (iii) Hazard Markers, and
- (iv) Object Markers

2.2 Each of these serves a somewhat different purpose. “Roadway indicators” are intended to delineate the edges of the roadway to guide drivers about the alignment ahead, particularly where it might be confusing for some reason. The objective of “hazard markers” is to define obstructions like guard-rails and abutments adjacent to the carriageway, for instance at culverts and bridges which are narrower than the roadway width at approaches. “Object markers” are used to indicate hazards and obstructions within the vehicle flow path, for example channelizing islands close to the intersections, roundabouts at the intersections or electric poles or trees located within the Right of Way (RoW).

2.3 At the same time, it is to be borne in mind that the delineators are basically driving aids and should not be regarded as a substitute for warning signs, road markings, or barriers for out-of-control vehicles.

3. ROADWAY INDICATORS

Design

3.1 Roadway indicators are popularly called as Delineators or Guide Poles. It is basically a form of guide posts made of Mild steel with pure polyester powder coating with the minimum thickness of powder coating of not less than 40 micron for protection against corrosion. The surface should be concealed so that there should not be any exposed surface without powder coating. Alternatively, these metal guide poles can be concealed with thermoplastic body which is of course somewhat cost prohibitive. The posts shall have an ellipsoidal or circular design with the height of the pole shall be 800 to 900 mm above the ground with about 200 to 300 mm base which can be anchored onto the ground. Mild steel Guide Poles shall conform to Type XI sheeting specifications as per IRC:67 and ASTM D 4956 which would ensure to obtain clear visibility of the road alignment during night time (refer **Fig. 1**). In this context, to achieve enhanced visibility of the curved portion of the road, guide poles shall have substantial area

allocated to exhibit alternate band of black paint and white retro reflective sheeting which can provide added aesthetics as well. The above arrangement shall be in place on both sides of poles in the case of undivided carriageways having sharp curves.

To prevent complete vandalism of the above, it is recommended to house the sheeting coupled with concealed edges as shown in **Fig. 1**. The normal spacing between two successive guide poles shall be about 50 to 70 m center to center in case of high speed interurban roads catering to high volume traffic. However, in the case of low volume roads as well as rural roads located on rolling and hilly terrain, concrete delineators (shown in **Fig. 2**) can be used as these would be less costly.

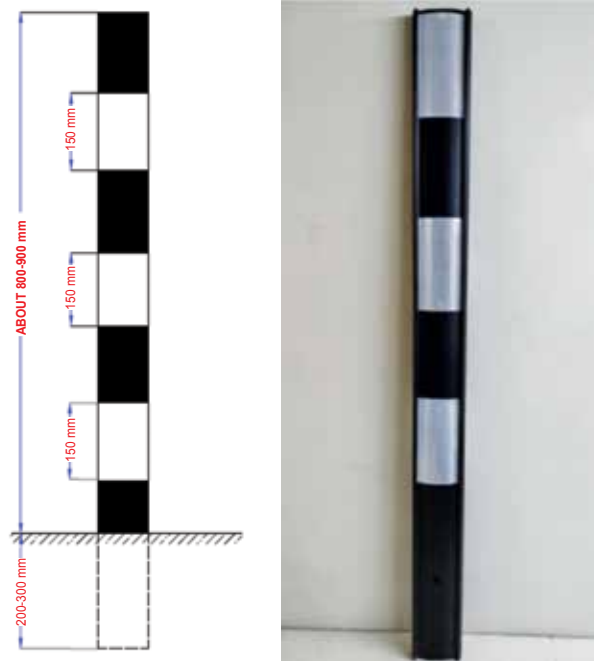


Fig. 1 Typical View of Delineators

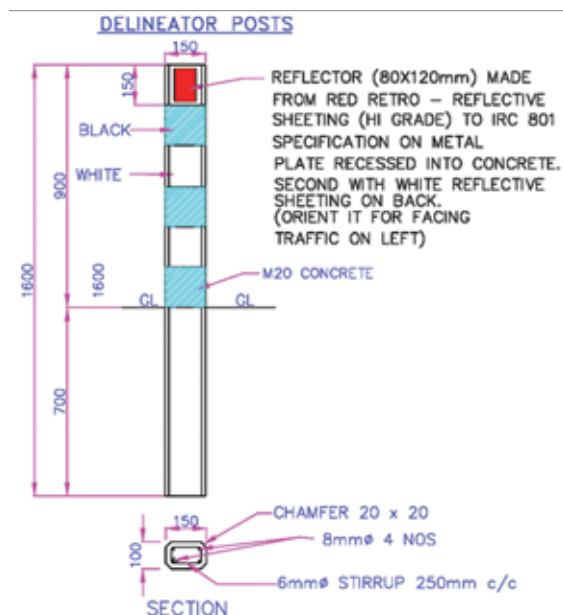


Fig. 2 Typical View of Concrete Delineators

3.2 As an alternative to guide poles in work zones, plastic drums with alternative red and white retro-reflective stripes of 100 to 150 mm wide conforming to Type IV Standards (Reboundable work zone sheeting as per ASTM D 4956 Clause S2) shall be used for roadway delineation as shown in **Fig. 3**, especially when it is for temporary purpose in the event of diversions, road works etc.

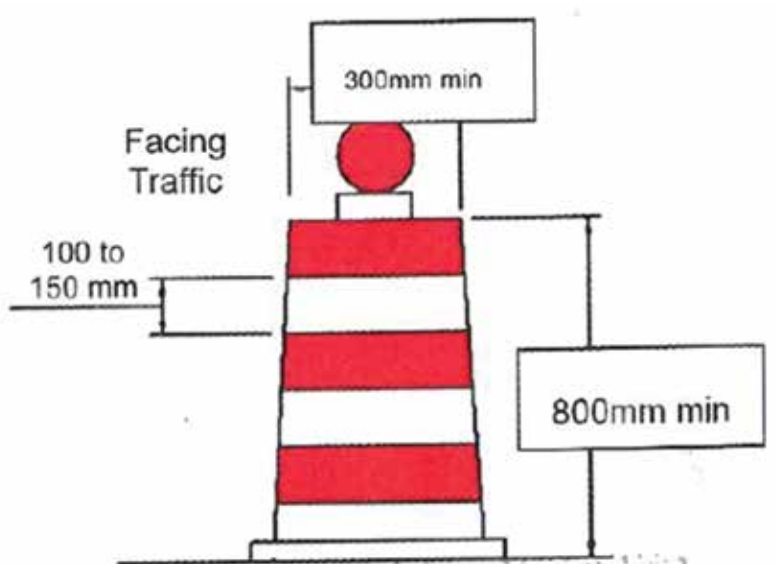


Fig. 3 Temporary Delineator Posts for Work Zones

3.3 These temporary guide posts shall possess a height of about 800 to 900 mm above the ground with about 200 to 300 mm base anchored onto the ground. Such temporary delineators shall have three stripes of retro reflective sheeting (each stripe with 150 sq cm or above) of Type XI conforming to IRC:67 and ASTM D-4956 which would ensure clear visibility during night time as shown in **Fig. 3**.

3.4 These guide poles shall be always retro reflective in nature as it helps to improve visibility at night and at locations where visibility is poor due to fog etc. As mentioned earlier, the posts should have alternate band of black colour paint and white retro reflective sheeting of Type XI as per IRC:67 and ASTM D-4956. White colored retro reflective sheeting should be fixed on reverse side of posts in the case of undivided carriageways having sharp curves.

Application

3.5 The decision to use roadway indicators, whether continuously or in short sections selectively, will be guided by factors such as importance of the road, quantum of fast traffic, speed of travel, road crash records, danger posed by any specific deficiency in the road alignment, etc. The primary use of roadway indicators in non-urban sections of main roads is especially in curved reaches. However, in the urban stretches, the use of delineators could be decided based on warrants of the road and traffic conditions including the road stretches which are not adequately lighted. Application photographs are given in **Fig. 4**.

3.6 In situations where a guard-rail or parapet wall is provided for safety, roadway indicators shall be mounted above or immediately behind the guard-rail. In addition, the guard-rail shall be treated with Retro-reflective sheeting of Type VI black and yellow stripes with Aluminum backed flexible prismatic sheeting conforming to ASTM D4956-09 which is applicable for reboundable devices.



Fig. 4 Typical Illustration of Utility of Delineators during Day and Night Time

Criteria for Use

3.7 Normally, use of roadway indicators should be considered under the following situations:

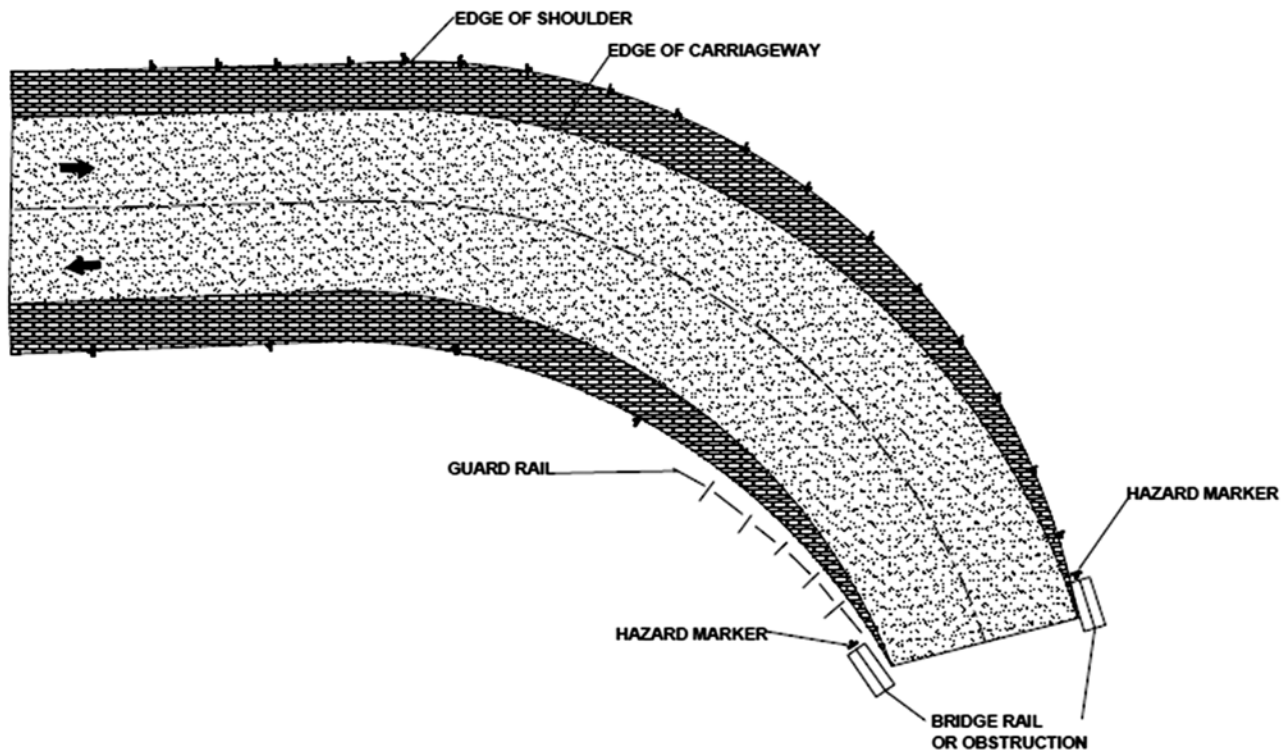
- (i) Curved Sections
 - (a) Horizontal curves of radius 300 m or less.
 - (b) Vertical curves with inadequate visibility.
- (ii) Straight Sections
 - a. Road sections where visibility is often poor due to mist, fog or snowy conditions
 - b. Reaches where the alignment appears uncertain to the driver, e.g. pavement width transitions, temporary road diversions, etc.
 - c. Road sections subject to frequent submergence and ponding due to storm water
 - d. Approaches to narrow bridges and culverts
 - e. Valley side of hill roads
 - f. Road embankment exceeding 3 m in height
 - g. Approaches to important intersections
 - h. Special problem points such as causeways and tunnels.

Placement and Spacing

3.8 As a general rule, roadway indicators should be erected at the edge of the usable shoulder and in the case of kerbed sections at a distance of 0.6 m from the kerb face. On hilly terrains, they may be placed either on the parapet or at the edge of the earthen shoulder depending on the available roadway width and Right of Way (RoW).

3.9 The overall line of posts should be parallel to centre line of the road ordinarily, except that at guard-rails or other obstructions, it may be so adjusted that the delineators are in line with or inside the innermost edge of the obstruction (see **Fig. 5**). As far as practicable, the top of the posts should be in uniform grade, taking into account the effects of shoulder cross fall and super elevation.

3.10 On straight sections, roadway indicators should be spaced uniformly 50-70 m from each other, according to local conditions, the posts being in pairs, one on each side of the roadway. On divided roads, these should also be provided on medians to meet the condition of providing them on inside of the horizontal curves. Where the normal uniform spacing is affected by cross-roads, driveways etc. and a delineator would fall in that area; the same may be moved in either direction a distance not exceeding one quarter of the usual spacing. If it still falls in such a zone, it should be omitted.



Delineators mounted above or immediately behind Guard Rail. The placement of delineators are not at constant distance from roadway edge because of the Bridge Rail

Note:-

Delineators should be placed at a constant distance from the carriageway edge except that when an obstruction exists near the pavement edge, the line of delineators should make a smooth transition so as to be in line with the obstruction.

Fig. 5 Illustration of Roadway Indicator Installation on the Curved Approach to a Bridge

3.11 On horizontal curves, the spacing should be fixed in relation to the curve radius as given in **Table 1**. In addition, some delineators should be continued beyond the curve on either side. The spacing of first, second and third roadway indicators on the approaches, in advance and beyond the curve, should be $1.8S$, $3S$ and $6S$ respectively (where S is the normal spacing on the curve) but not exceeding 50 m. The method of placement is explained in **Fig. 6**.

Table 1 Recommended Spacing for Roadway Indicators on Horizontal Curves

Radius of Curve (meters)	Spacing on Curve, (S) (meters)
30	6
50	8
100	12
200	20
300	25

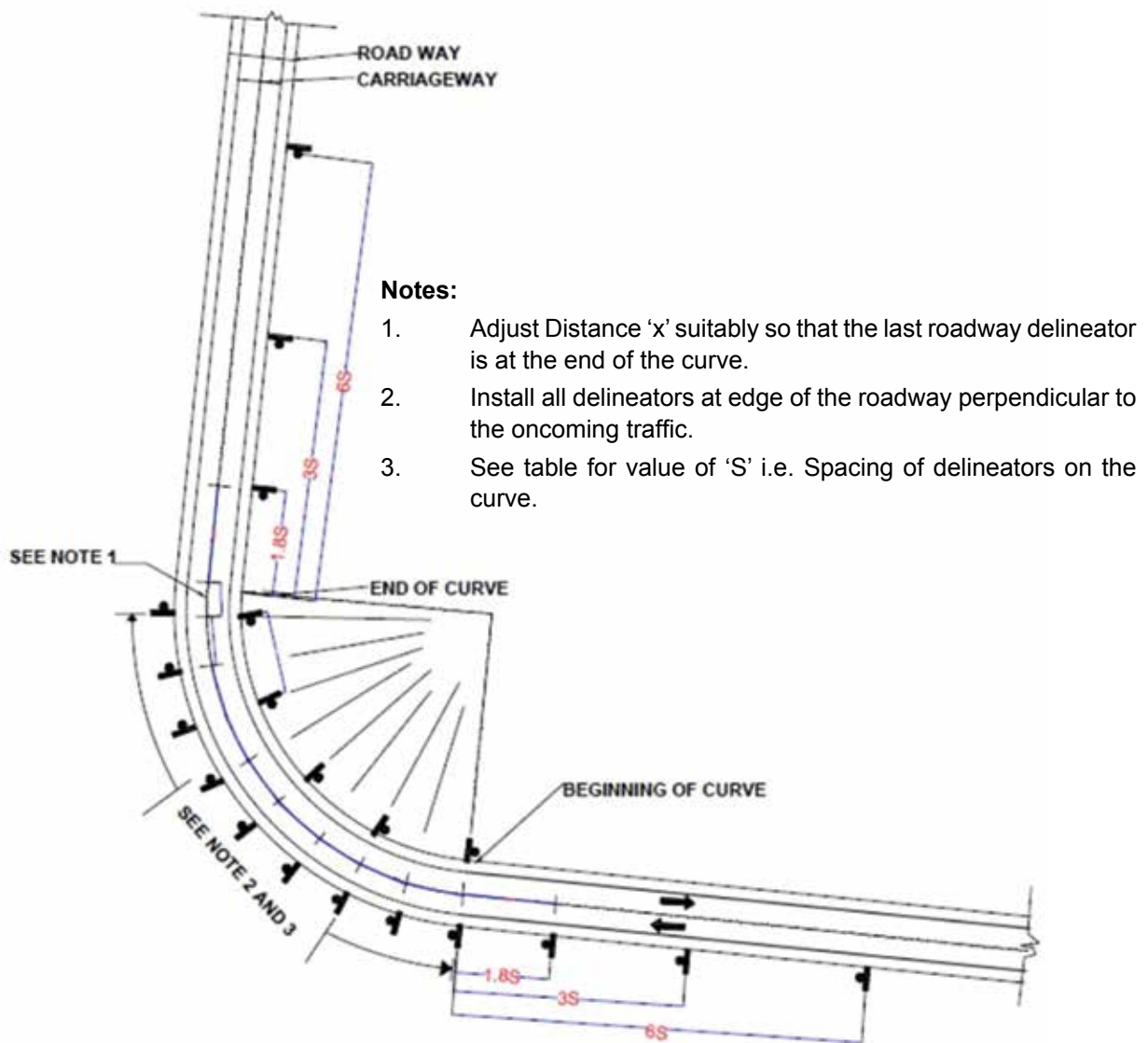


Fig. 6 Typical Illustration of Delineator Spacing on Horizontal Curves

3.12 On vertical curves where visibility is not adequate, roadway indicators should be provided at a spacing of 30 to 50 m depending on the sharpness of the curve.

3.13 At problematic locations like causeways, road delineators may be installed at a much smaller spacing, say 5 or 10 m, according to local conditions.

4. MEDIAN MARKER

Flexible Median Marker (FMM) should be used for improving median visibility during dark hours. Use of Median Marker provides safety against collision happening with medians during night time or severe weather. Flexible Median Markers shall be provided with fluorescent yellow colour retro reflective sheeting Type XI as per IRC:67. Flexible Median Marker shall be of tough, high impact resistant, injection-molded, thermoplastic body with property of flexibility to provide high durability and U shape structure having rebound/bounce back property (refer **Fig. 7** for typical illustration).

As mentioned earlier, the sheeting shall be of Type XI conforming to IRC:67 and it should be on both the faces whereby providing maximum reflectivity at longer distances with adequate durability. The logo of the manufacturer shall be embossed on either side of the body during the injection molding process. FMM shall be fixed by a combination of epoxy adhesive and grouting/drilling on concrete medians or properly constructed solid medians.

A. Colour

The marker body shall be produced in neutral Black colour. The colour of the retro reflective element shall be Florescent Yellow.

B. Material

The plastic body of the FMM shall be moulded from Flexible Thermoplastic Body.

C. Dimensions

Height: The marker height shall be a minimum of 180 mm.

Width: The marker width shall be a minimum 120 mm.

Body Thickness: Minimum of 6.5 mm.

Shank Length: Each of the shanks shall not be less than 20 mm and depth shall not be less than 30 mm.

Reflective Area: Shall not be less than 90 cm square.

D. Performance

Reboundability

The body of FMM shall bounce back to its original position after 750 numbers of hits using pendulum of 1.8 kg conforming to ASTM D 256.

Tensile Test

Adhesion between the body and outer casing body of FMM shall withstand 50 Kgf tensile loads conforming to ASTM D 638 method.

Application and placement

FMM shall be used for the illumination of median as well as Parapet wall structures etc. Recommended minimum application distance is 2 m in the case of urban areas, 5 m for interurban highways and expressways or as suggested by Engineer In-charge (Refer **Fig. 8**).

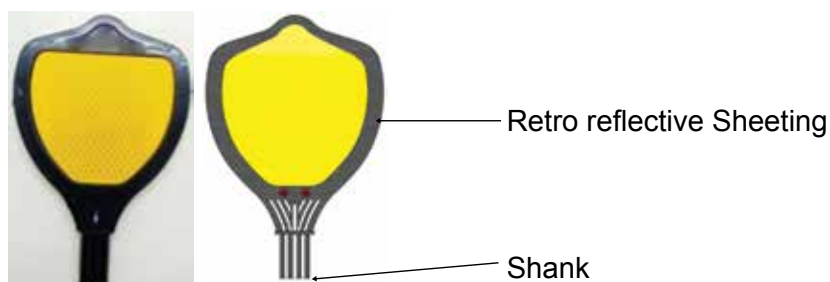


Fig. 7 Typical Illustration of Flexible Median Markers



Fig. 8 Typical Illustration of Utility of Flexible Median Markers during Day and Night Time

5. HAZARD MARKERS

Design

5.1 The following designs shall be adopted for hazard markers:

The striped markers consisting of alternating black and yellow stripes sloping downward at an angle of 45° towards the side of the obstruction on which the traffic is to pass (see **Fig. 9**). Hazard marker to be made with Type XI sheeting conforming to IRC:67.

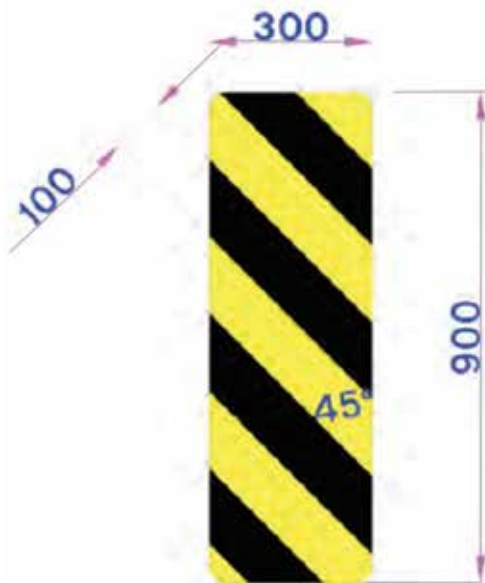


Fig. 9a Object Hazard Sign (Left)

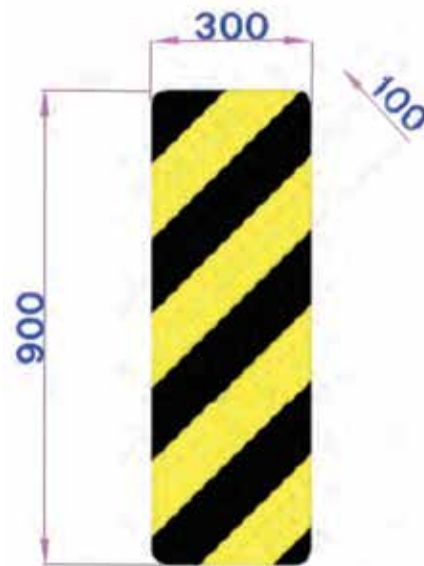


Fig. 9b Object Hazard Sign (Right)



Fig. 9c Object Hazard Marker Two Way Sign (For Two Way Hazards)

Application and Placement

Object Hazard Markers (OHM) should be put up wherever there are objects on the edge of the travelled way which can lead to road crashes. For e.g. bridge abutments, guard rails, etc.

5.2 These OHM should be erected immediately ahead of the line of obstruction, for instance on a narrow bridge just where the bridge rail starts. When placed in conjunction with the guard-rail on a bridge approach, the OHM should be located immediately behind the guard-rail and at sufficient height to ensure that these will be properly visible to the oncoming traffic. The inside edge of the OHM should be in line with the inner edge of the obstruction as far as possible.

5.3 Typical application of these markers on a narrow bridge in continuation of a curve is shown in **Fig. 10**.



Fig. 10 Typical Illustration of Object Hazard Markers on Narrow Bridge

6. OBJECT MARKERS

Several designs of object markers are possible including circular shape. For example, such Aluminum-backed flexible prismatic reflective sheeting shall be used for application on the beam and post of the Metal crash barrier or porous concrete structures like roundabout, at bull noses, Traffic Police/Toll Booth Structures, as well as at entry/exit points of the Tunnel structures aimed at enhancing nighttime visibility (refer **Fig. 11**).

6.1 This Aluminum-backed flexible prismatic sheeting shall be made of yellow colored flexible prismatic sheeting with non-metallic prismatic lens formed in a transparent, synthetic resin as retro reflective elements. This flexible prismatic sheeting shall have black and yellow stripes with aluminum backed flexible prismatic Type VI sheeting conforming to ASTM: D4956 specifications and standards of coefficient of retro reflectivity, flexibility and impact resistance applicable for reboundable devices. This flexible prismatic sheeting shall have screen printed arrow/slant line pattern in black colour in a continuous roll format. These object markers may be bigger if the conditions so warrant on the ground.



Fig. 11 Typical Illustration of Placement of Flexible Object Markers

Application

6.2 Typical locations where such flexible object markers can be used are given in **Fig. 11**:

- (i) On the beam and post of the Metal Crash Barrier (MCB)/Wire Rope Barrier post.
- (ii) Periphery of the roundabout as well as bull noses of the traffic islands pointing towards the direction of travel.
- (iii) Traffic Police/Toll Booth Structures as well as at entry/exit points of the Tunnel structures etc.

Placement

6.3 These markers should be pasted on the above locations for instance in the case of a channelizing island/roundabout at its nose point only (facing the direction of traffic) without

having the need to put on the entire periphery which will help in achieving enhanced safety with minimal investment. Width of object marker shall be 300 mm and length of object markers might vary depending upon the situation but shall be generally minimum around 400 to 500 mm so that reflectors are fully visible to the approaching traffic as shown in **Fig. 11**.

7. INSTALLATION

7.1 Techniques of installation can vary according to nature and stiffness of the ground, and local custom. A proper foundation with M-25 grade of concrete shall be used for the installation of all types of delineators. Installation should ensure that the post does not change its orientation, particularly when it is of a circular shape.

7.2 The delineators should be so positioned that the retro reflectorised face is perpendicular to the direction of travel.

8. MAINTENANCE

To remove dirt, the delineator should be periodically scrubbed clean, especially after rains. Warranty of reflective sheeting should be in accordance with IRC:67. The ground around the delineators should be kept clean by cutting grass and bushes periodically so that visibility of the above delineators suggested for installation at any specific location is not affected.

(The Official amendments to this document would be published by the IRC in its periodical, 'Indian Highways' which shall be considered as effective and as part of the Code/Guidelines/Manual, etc. from the date specified therein)